CLAIMS

What is claimed is:

1. An implantable endocardial lead having a longitudinal axis and extending between proximal and distal ends for use with a cardiac stimulation device, the lead comprising:

an electrical conductor within the lead extending between proximal and distal ends;

an active fixation electrode comprising an electrically active helix coaxial with the endocardial lead, coupled to the distal end of the electrical conductor, and movable between a retracted position fully within the lead and an extended position advanced beyond the distal end of the lead for effecting penetration into the myocardial tissue; and

a guide system located proximally of the active fixation electrode for rotating the electrically active helix about the longitudinal axis as the helix is moved between the retracted and extended positions.

2. An implantable endocardial lead having a longitudinal axis and extending between proximal and distal ends for use with a cardiac stimulation device, the lead comprising:

an electrically active housing comprising a tubular end region extending to a terminal rim at the distal end of the lead;

an electrical conductor within the lead extending between proximal and distal ends;

an active fixation electrode within and spaced from the electrically active housing and comprising an electrically active helix coaxial with the endocardial lead coupled to the distal end of the electrical conductor and movable between a retracted position fully within the housing and an extended position advanced beyond

the terminal rim of the housing for effecting penetration into the myocardial tissue; and

a guide system located proximally of the active fixation electrode for rotating the electrically active helix about the longitudinal axis as the helix is moved between the retracted and extended positions.

3. An implantable endocardial lead as set forth in claim 2

wherein the electrically active housing comprises:

a generally planar bulkhead member extending transversely of the longitudinal axis; and

a tubular end region extending away from the bulkhead member to the terminal rim at the distal end of the lead; and

wherein the guide system comprises:

a spiral track member extending proximally away from the bulkhead member to a proximal rim distant from the bulkhead member; and

wherein the active fixation electrode comprises:

a conductive shaft having an outer peripheral surface and extending between proximal and distal ends and having an outwardly projecting follower member slidably engaged with the spiral track member, the electrical conductor being fixed to the proximal end thereof.

4. An implantable endocardial lead as set forth in claim 2 comprising:

an insulation sheath covering the electrical conductor, the sheath and the electrical conductor together defining an internal chamber extending from the proximal end to the distal end; and

an electrical connector being coupled to the proximal end of the electrical conductor.

5. An implantable endocardial lead as set forth in claim 2 and further comprising:

a resilient coupling mechanism for maintaining electrical continuity between the active fixation electrode and the electrically active housing throughout movement of the active fixation electrode between the retracted position and the extended position.

6. An implantable endocardial lead as set forth in claim 2

wherein the conductive shaft comprises:

an outer peripheral surface and extending between proximal and distal ends and having an outwardly projecting follower member slidably engaged with the spiral track member, the electrical conductor being fixed to the proximal end thereof;

an annular collar integral with the conductive shaft intermediate the proximal and distal ends and projecting radially from the longitudinal axis to an outer rim beyond the outer surface of the conductive shaft; and

a head portion coaxial with and extending distally from the annular collar and being of reduced diameter than the annular collar to define a distal annular shoulder at its intersection with the annular collar; and

wherein the spiral track member has an internal peripheral surface facing and slidably engaged with a part of the conductive shaft;

a compression spring intermediate and engaged with the bulkhead member and with the distal annular shoulder;

the annular collar being distant from the bulkhead member when the active fixation electrode is in the retracted position and being proximate the bulkhead member when the active fixation electrode is in the extended position, the compression spring biasing the annular collar in a direction away from the bulkhead member.

7. An implantable endocardial lead as set forth in claim 2

wherein the active fixation electrode comprises an electrically active helix advanceable outward relative to the distal end of the conductor for effecting penetration into myocardial tissue;

8. An implantable endocardial lead as set forth in claim 2 and further comprising:

a therapeutic element integral with the active fixation electrode formed of a biocompatible matrix material being of sufficient rigidity to penetrate the myocardial tissue.

9. An implantable endocardial lead as set forth in claim 2 and further comprising:

a therapeutic element generally cylindrical in shape coaxial with and fixed on the distal end of the conductive shaft and formed of a biocompatible matrix material being of sufficient rigidity to penetrate the myocardial tissue.

10. An implantable endocardial lead as set forth in claim 2

wherein the conductive coupling is cup-shaped and comprises a base lying in a plane transverse of the longitudinal axis of the conductive shaft and a cylindrical sidewall upstanding from the base and coaxial with the longitudinal axis of the conductive shaft, the base having a bore for slidable reception on the conductive shaft; and

wherein the compression spring extends between the base and the conductive stopper.

11. An implantable endocardial lead as set forth in claim 10 wherein the sidewall and base of the conductive coupling define a cavity for reception of the conductive shaft, of the conductive stopper, and of the compression spring coaxially received on the conductive shaft.

12. An implantable endocardial lead as set forth in claim 2 wherein the active fixation electrode comprises an electrically active helix advanceable outward relative to the distal end of the conductor for effecting penetration into myocardial tissue; and

wherein the electrically active housing comprises an electrically active collar coaxial with the helix at the distal end of the lead.

13. An implantable endocardial lead as set forth in claim 3 wherein the electrically active helix is fixed to the distal end of the conductive shaft.

14. An implantable endocardial lead as set forth in claim 3 wherein the electrically active housing comprises:

a cylindrical guide member integral with and extending proximally away from the bulkhead member and having an inner facing peripheral surface; and

wherein the guide system comprises:

a spiral track member formed into the inner facing peripheral surface of the cylindrical guide member and defined by opposed spaced parallel side walls.

15. An implantable endocardial lead as set forth in claim 3

wherein the electrically active housing comprises:

a cylindrical guide member integral with and extending proximally away from the bulkhead member and having an inner facing peripheral surface; and

wherein the guide system comprises:

a spiral track member formed into the inner facing peripheral surface of the cylindrical guide member and defined by opposed spaced parallel side walls and a bottom wall connecting the side walls.